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Tracing the scientific outputs of Iranian papers on Dermatology research based on publications in the Web of Science

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Abstract

Dermatology is the branch of medicine dealing with the skin, nails, hair and its diseases. It is a Specialty with both medical and surgical aspects. Systematic research plans on any subject, including dermatology. Dermatology is in need of solid data to identify the gaps in the research. This study aimed to elucidate the most important trends, directions, and gap in this subject. The data, extracted from the Institute for Scientific Information, were used to perform a bibliometric analysis of the scientific productions (1974–2016) about dermatology. Specific parameters related to dermatology were analyzed to obtain a view of the topic's structure and document relationships. Additionally, the trends and authors in the most influential publications were analyzed. The results demonstrate the growth of scientific production in this field between 1974 and 2015. 533 institutes which were involved in writing the papers, with the Tehran Univ Med Sci and Shiraz Univ Med Sci at the top of the list respectively. According to the Betweeness Centrality Indicators of terms on the maps, the most active research areas in the field are as follows: Burn, Epidemiology, Treatment, Scar, Quality of Life, Vitiligo, Wound Healing, Platelet-Rich Plasma, Mycosis Fungoides, and Cryotherapy. Through performing the first scientometric survey on dermatology research, we analyzed the characteristics of papers and the trends in scientific production. Co-word analysis revealed outstanding topics of the field, which is useful for policy makers to learn about the research status and make appropriate decisions for the promotion of scholarly products.

Keywords: Dermatology; scientometric Analysis; Scientific output

Introduction

Dermatology is the branch of medicine dealing with the skin, nails, hair and its diseases. It is a Specialty with both medical and surgical aspects (Random, 1997). In practice, dermatology includes all aspects of diseases (both internal and external factors) which affect the skin and its contents such as hair, nails, sweat glands as well as oral mucus membrane and external genital membrane. Sexually transmitted diseases are also categorized in dermatology sphere (Burns et al. 2010). There are as many as 3,000 disorders in dermatology area. Such a large number includes numerous groups with a huge variety in terms of etiology: from genetic disorders to infectious diseases, caused by environmental factors, multifactorial disorders, together with a large number of idiopathic diseases. If the outbreak and consequences caused by such diseases are taken into account, differentiation and spectrum spread of such a large number of diseases will even increase (Bickers et al, 2006, Khatami and Zartab, 2011).

Based on some statistics, at every period of time, one-fourth to one-third of people suffers at least one single skin disease (Burns et al. 2010). However, more recent studies reveal that the outbreak of skin diseases are far more both in developed and developing countries (Wolkstein, et al., 2003). Meanwhile, there is a rampant pattern of skin diseases in these countries with

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different dermatologic disorders. In industrial countries, those who are interested in dermatologic epidemiology have found it interesting to focus on emerging infectious diseases such as Herpes simplex, genital warts, and environmental diseases such as skin damages caused by sun exposure, malignant melanoma, and non-melanoma skin cancer. Bickers et al, in a new study, have reported that 165 million Americans suffered from Herpes complex and Herpes zoster in 2004. They added that in 2004, three out of 83 million had been diagnosed with genital warts and human papillomavirus (HPV). There were more skin disease claims across the US population in 2013 than cardiovascular disease, diabetes, or end-stage renal disease, a separate report revealed (Edison and Bruce, 2017). Skin diseases are considered as the main causes of inability in developing countries. In such territories, affliction with dermatologic diseases varies from 20% to 80% (Hay et al., 2006). Where infections and contaminations are chiefly blamed (Rosenbaum, et al., 2017).

Figueroa and et al. implemented a survey study aimed at studying dermatological community-based needs in a rural community southwest of Ethiopia. They came to the conclusion that the most common skin diseases were contaminations caused by parasites such as scabies, pédiculose and onchocerciasis (46%), followed by bacterial and fungal infections (33%) (Figueroa et al., 1998. Across the globe, there are numerous common dermatosis like acne and psoriasis. Almost all dermatologic diseases have one common characteristic: they are visible. Such property can often cause a burden for patients. The disease itself is bothering (intense itching for instance) and the appearance problem, which has been reported in 68% of patients, doubles the problem. Besides, limited activity will result in high treatment costs as well as social inabilities (Edison and Bruce, 2017, Johnson, 2004).

Overall, research and studies on dermatologic subjects are crucial due to the following reasons:

- Skin diseases are very common, affecting up to a third of the population at any one time.
- Skin diseases have serious impacts on life. They can cause physical damage, embarrassment, and social and occupational restrictions. Chronic skin diseases may cause financial constraints with repeated sick leave. Some skin conditions can be life-threatening.
- Health expenditure for skin diseases is high.

Therefore, many investigators have published articles in this field [(Rosenbaum, et al., 2017, Storan and Irvine, 2017, Bakker, 2012). However, there has been no systematic analysis of this increasing number of papers. A scientometrics method is one that measures and analyzes scientific publications related to a specific topic regarding the trends in citations, most important content, authors, and journals. A widespread use of scientometric method goes back to 1960s when Eugene Garfield finalized the construction of Science (Garfield, 1964). This method is useful for assessing the scientific advancements and motivations of researchers and determining current research directions in a specific field; such data would be extremely useful for guiding subsequent research designs as it will predict how this field would move forward (Hendrix, 2012, Hendrix, 2010). The aim of this study was to perform a scientometric analysis of articles on dermatology by Iranian researchers from 1974 to 2016 with the help of bibliometric indicators using the Institute for Scientific Information (ISI) Web of Science.

Materials and Methods

A bibliometric study was performed on the articles related to "Dermatology" published between 1974 and 2016. Our main source was chosen from the ISI Web of Science database, available at http://www.isiknowledge.com because it is one of the major sources for bibliometric, citation and other academic impact information of scientific articles in various branches of sciences. All three resources available in the ISI web of science were used for this purpose (Science Citation Index Expanded; Social Sciences Citation Index; the Arts & Humanities Citation Index). Terms, used for the searches, were chosen in accordance with Web of science category, WC=Dermatology and restricted to country, CU=Iran. Which yielded a total of 837 publications. Our search covered papers published between 1974 and 2016. We conducted the search on July 20, 2017.

Specific parameters such as the publication year, articles' language, subject distribution, first author, main journals in this field, citations of the paper by other papers, and institutional affiliations were retrieved from the ISI and analyzed with the analyze function provided by the ISI database. Each journal's impact factor was retrieved from the Journal Citation Reports available at http://scientific.thomson.com/products/jcr. All statistical analyses were performed using Microsoft Excel 2010 computer spreadsheet software and UciNet software. A Thematic structure of the dermatology field was created by including articles with a frequency of 4 up. 60 documents which had these characteristics are selected.

Results

Annual Publication Number during 1974 -2016

There were a total of 837 research articles on dermatology in the ISI Web of Science during 1974 -2016. These papers were drafted by 2359 authors, 48 countries, 533 institutions and were published in 62 journals in 2 languages. In Fig. 1, time trend of the number of articles is shown. The 77 published articles in 2016 compared to 1 articles in 1974 shows a 70-fold increase (Fig.1).

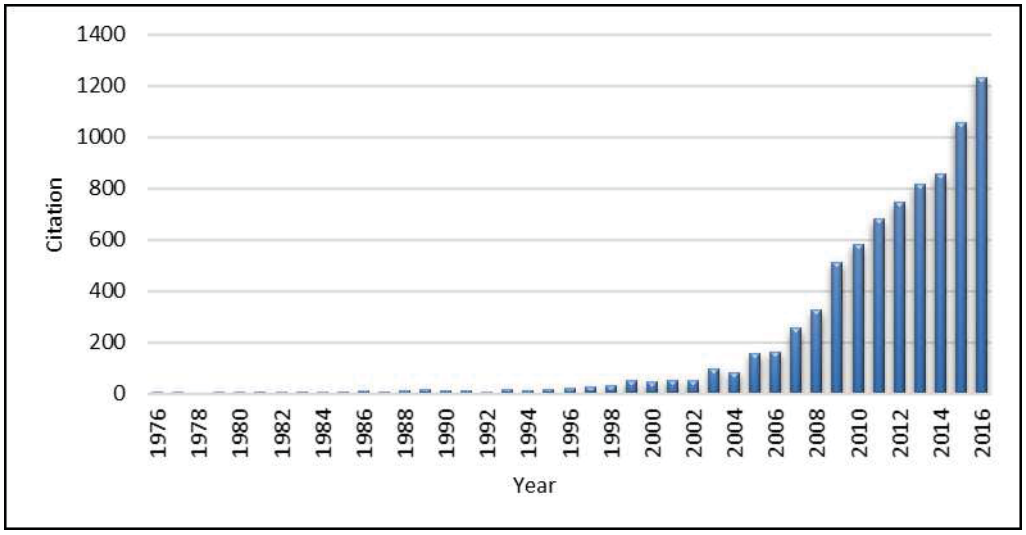

Figure 1. Trend in the number of the dermatology publications by year

Citation Profile of Articles

The number of citations cannot always be used to judge the quality of a paper, but it is a measure of its impact on Subject of research (Zhang et al., 2016). Total of citations were 8075 times. The average citations per paper (C/P) was 9.65. Table 1 shows the top 10 highly cited articles in this field.

The most frequently cited article was 'Skin Manifestations of Mustard Gas- a Clinical- Study of 535 Patients Exposed to Mustard Gas' published in 1992 by Momeni; Enshaeih; Meghdadi; et al. It was cited 111 times as it was after 16 years that the first published in dermatology in 1974, which vastly exceeds the citation of other articles on dermatology.

Table 1. Articles with highest number of dermatology-related citations

NO	*Title*	*Author*	*Citation*	*Journal*	*IF*
1	Skin Manifestations of Mustard Gas- A Clinical- Study of 535 Patients Exposed to Mustard Gas	Momeni, Az; Enshaeih, S; Meghdadi, M; Et Al	111	Archives Of Dermatology.1992;128(6):775-780	4.789
2	Prevalence, Severity, and Severity Risk Factors of Acne in High School Pupils: A Community-Based Study	Ghodsi, S. Zahra; Orawa, Helmut; Zouboulis, Christos C.	103	Journal Of Investigative Dermatology.2009;129(9):2136-2141	6.287
3	Pemphigus: Analysis of 1209 cases	Chams-Davatchi, C; Valikhani, M; Daneshpazhooh, M; et al.	93	International Journal Of Dermatology.2005;44(6):470-476	1.56
4	Cutaneous leishmaniasis: Clinical aspect	Dowlati, Y	88	Clinics In Dermatology.1996;14(5):425-431	2.253
5	Comparison Between The Efficacy Of Photodynamic Therapy And Topical Paromomycin In The Treatment Of Old World Cutaneous Leishmaniasis: A Placebo-Controlled, Randomized Clinical Trial	Asilian, A.; Davami, M.	86	Clinical And Experimental Dermatology.2006;31(5):634-637	1.589
6	Randomized controlled open-label trial of four treatment regimens for pemphigus vulgaris	Chams-Davatchi, Cheyda; Esmaili, Nafiseh; Daneshpazhooh, Maryam; et al.	82	Journal Of The American Academy Of Dermatology.2007;57(4):622-628	7.002
7	Epidemiology and mortality of burns in the South West of Iran	Panjeshahin, MR; Lari, AR; Talei, AR; et al.	77	Burns.2001;27(3):219-226	2.056
8	New Combination Of Triamcinolone, 5-Fluorouracil, And Pulsed-Dye Laser For Treatment Of Keloid And Hypertrophic Scars	Asilian, Ali; Darougheh, Afshin; Shariati, Fazlolah	73	Dermatologic Surgery.2006;32(7):907-915	2.351
9	Dermatophytoses In Iran	Khosravi, Ar; Aghamirian, Mr; Mahmoudi, M	72	Mycoses.1994;37(1-2):43-48	2.252
10	A Model For Thermal Ablation Of Biological Tissue Using Laser-Radiation	Partovi, F; Izatt, Ja; Cothren, Rm; Et Al.	72	Lasers In Surgery And Medicine.1987;7(2):141-154	2.312

Until 1999, papers about Dermatology were rarely cited. Since then, citations have consistently increased; papers about Dermatology were cited 5 times in 1999. Other peaks occurred in 2013, to 2016 (Fig. 2). The number of citations closely followed the number of publications. The number of citations per year reached its maximum in 2016 (1231 citations).

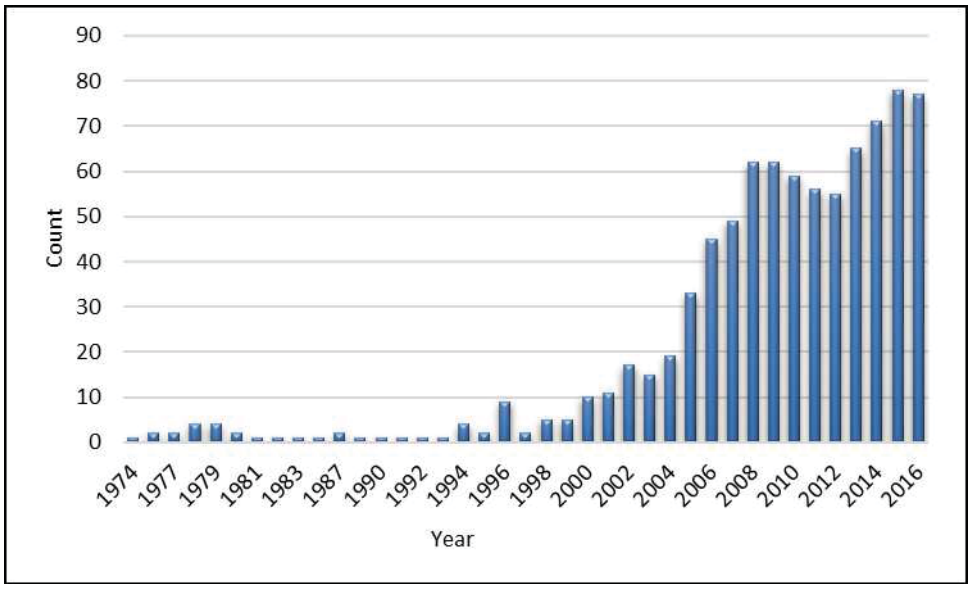

Figure 2. Citation of papers about Dermatology, published between 1974 and 2016

Subject Analysis of the articles in dermatology field

There were 2935 keywords used for the dermatology research field. Among these, only 34 keywords appeared more than ten times. The Top 60 high-frequency keywords were selected.

In the following, the map between these keywords has been considered. These are several indicators for co- word analysis that can be used in scientific maps. According to Freeman, measures of centrality are three categories: closeness, degree and betweeness (Freeman, 2004). Figure 3 shows co-word network According to Betweeness Centrality. Betweenness centrality identifies an entity's position within a network in terms of its ability to make connections to other pairs or groups in a network. Un entity with a high betweenness centrality generally: Holds a favored or powerful position in the network, represents a single point of failure, Has a greater amount of influence over what happens in a network (Scott, 2011).

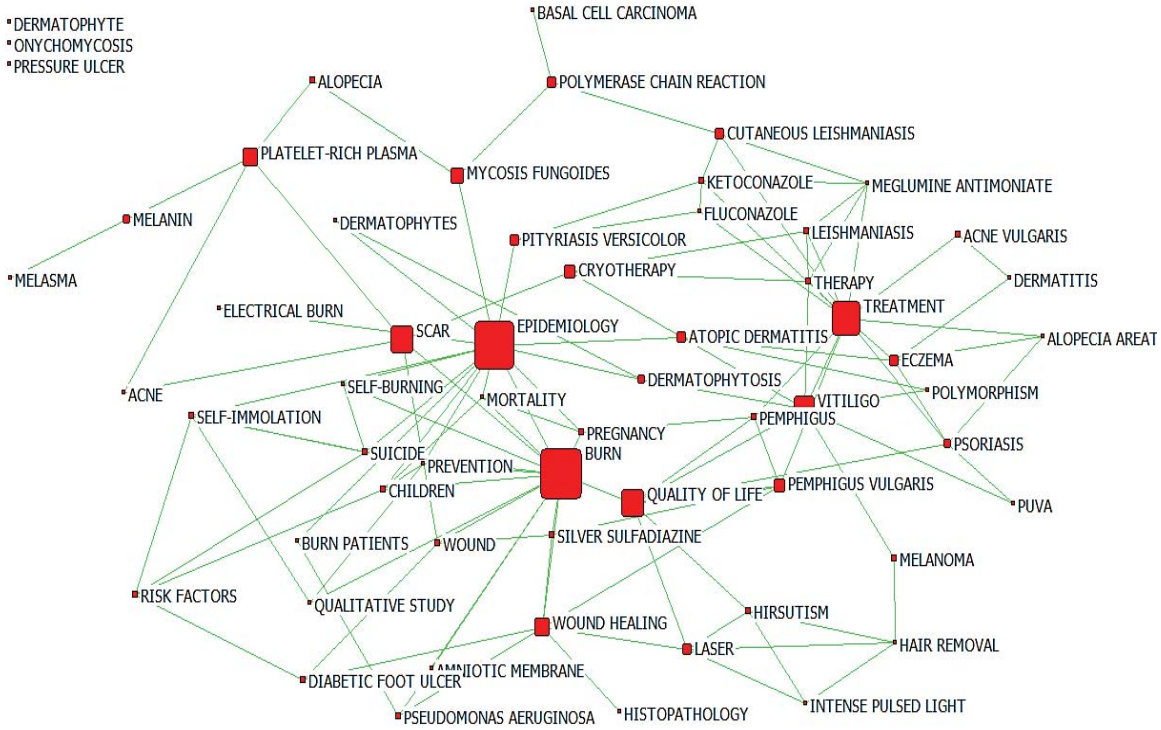

Figure 3. Co-occurrence network of the top 60 keywords from published articles of the dermatology field.

In figure 3, each square (node) indicates the keywords, and the lines represent the relationship between them. The top 10 Keywords with high betweeness centrality were as follows: Burn, Epidemiology, Treatment, Scar, Quality of Life, Vitiligo, Wound Healing, Platelet-Rich Plasma, Mycosis fungoides, and Cryotherapy. In Table 2, 10 superior figures in terms of centrality measures and frequency of keywords have been listed.

Table 2. The keywords with the highest frequency and Betweeness centrality

NO.	*Keywords*	*Frequency of Keywords*	*Keywords*	*Betweeness Centrality*
1	BURN	62	BURN	27.042
2	EPIDEMIOLOGY	25	EPIDEMIOLOGY	25.096
3	TREATMENT	20	TREATMENT	17.489
4	SCAR	6	SCAR	13.335
5	QUALITY OF LIFE	8	QUALITY OF LIFE	13.305
6	VITILIGO	22	VITILIGO	12.288
7	WOUND HEALING	24	WOUND HEALING	8.660
8	PLATELET-RICH PLASMA	4	PLATELET-RICH PLASMA	7.478
9	MYCOSIS FUNGOIDES	4	MYCOSIS FUNGOIDES	6.695
10	CRYOTHERAPY	7	CRYOTHERAPY	5.450

Journals, and Author Profiles of Publications

Table 3 shows the 10 most active authors and the authors with highest number of citation.
Dr Firooz from Tehran University of Medical Scienc (TUMS) with 45 articles had the largest number of publications in the field of dermatology research, followed by M Daneshpazhooh from TUMS (n = 41), C Chams-Davatchi from TUMS (n= 36), and Y Dowlati from TUMS (n = 31). We also quantified whether these authors published as either the cited author. Clearly, the cited author, A. Firooz still ranked first (n = 676) in the dermatology field. Considering the fact that forth author (Dowlati) is the second highest in terms of the citation (n= 591). Similarly, the information in the table shows that the ranking of authors varies in terms of the number of records and citations.

NO.	*Athure*	*Records*	*Citations*	*NO*	*Athure*	*Records*	*Citations*	*H-index*
1	Firooz A	45	676	1	Firooz A	45	676	16
2	Dowlati Y	31	591	2	Daneshpazhooh M	41	460	12
3	Chams-Davatchi C	36	546	3	Chams-Davatchi C	36	546	14
4	Daneshpazhooh M	41	460	4	Dowlati Y	31	591	12
5	Hallaji Z	17	330	5	Namazi Mr	23	225	8
6	Balighi K	19	312	6	Balighi K	19	312	9
7	Akhyani M	18	259	7	Akhyani M	18	259	9
8	Namazi Mr	23	225	8	Hallaji Z	17	330	10
9	Radmanesh M	16	140	9	Mansouri P	17	90	6
10	Mansouri P	17	90	10	Radmanesh M	16	140	8

Table 3. Most active authors and the authors with highest number of citation.

The h-index simultaneously measures the quality and quantity of the entire scientific output of a researcher, and it is one of the most commonly used indicators of research quality (Zhang et al., 2016). Consistently, we could conclude that A. Firooz, who had the highest h-index (n=16), could be considered authority in the dermatology field. But C. Chams-Davatchi is third in terms of the number of articles, but in H- index (n=14) he is the second one. Also Y. Dowlati is forth in terms of the number of articles but in H- index (n=12) is the third one. It should be underlined that all researchers come from TUMS. Although citations do not reflect the quality of a paper comprehensively, in a sense, they reflect a difference in scientific output.

Distribution of journals

All papers were published in 62 journals. The top five journals had more than 40 articles (Table 4). Approximately 38% of the WoS papers were published in these most productive top five journals (International Journal of Dermatology, Burns, Journal of the European Academy of

Dermatology, Mycoses, Clinical and Experimental Dermatology) which are considered the core journals of dermatology research under the Bradford Law (Zhang et al., 2016).

Table 4. Journals with highest number of dermatology related papers

NO.	*Journal*	*Country*	*Records*	*Citations*	*C/A*	*IF*
1	INTERNATIONAL JOURNAL OF DERMATOLOGY	USA	130	1419(2)	10.91	2.056
2	BURNS	UK	120	1467(1)	12.22	1.56
3	JOURNAL OF THE EUROPEAN ACADEMY OF DERMATOLOGY AND VENEREOLOGY	USA	52	579(3)	11.13	3.528
4	MYCOSES	USA	50	447(4)	8.94	2.252
5	CLINICAL AND EXPERIMENTAL DERMATOLOGY	USA	41	448(5)	10.92	1.589
6	JOURNAL OF DERMATOLOGICAL TREATMENT	UK	38	300(6)	7.89	1.89
7	WOUNDS- A COMPENDIUM OF CLINICAL RESEARCH AND PRACTICE	USA	23	26(9)	1.13	1.948
8	INDIAN JOURNAL OF DERMATOLOGY	India	23	16(10)	0.69	0.99
9	INDIAN JOURNAL OF DERMATOLOGY VENEREOLOGY LEPROLOGY RESEARCH AND PRACTICE	India	22	184(7)	8.36	0.97
10	PEDIATRIC DERMATOLOGY	UK	21	139(8)	6.61	1.06

The journal that published the largest share of articles was International Journal of Dermatology (n = 130). In fact, according to the citations and C/A ratio, we can estimate that the two journals, Journal of the European Academy of Dermatology and Venereology, And Burns have the greatest influence on the field of dermatology. Moreover, although journals like, Clinical and Experimental Dermatology only published a few articles compare with the first journal, they received a high number of citations. There is no doubt that the ratio of C/A is closely linked to the quality of the articles.

Institute performances

Our results show that 533 institutes 837 papers published between 1974 and 2016. The Tehran University Med Sci, Shiraz Univ Med Sci, Isfahan Univ Med Sci, Iran Univ Med Sci were the top four most productive research institutes (table 5). Approximately 31.89 of papers with 2420 citations have been published by Tehran University of Medical Science.

Table 5. Institutions with Highest Number of Papers

NO.	*Organization*	*Count*	*Citations*
1	TEHRAN UNIV MED SCI	267	2420(1)
2	SHIRAZ UNIV MED SCI	83	751(4)
3	ISFAHAN UNIV MED SCI	60	855(2)
4	IRAN UNIV MED SCI	60	826(3)
5	SHAHID BEHESHTI UNIV MED SCI	59	197(7)
6	MASHHAD UNIV MED SCI	41	194(8)
7	UNIV TEHRAN	38	529(5)
8	ISLAMIC AZAD UNIV	34	185(9)
9	TABRIZ UNIV MED SCI	29	177(10)
10	RAZI HOSP	27	234(6)

Discussion

In this study, we have provided a supplemental evaluation of the status of dermatology in Iran. The objective of the present study was to perform a scientometrics analysis of all dermatology publications from Iranian researchers indexed in the Web of Science.
In scientometrics, quantitative statistical methods are employed to identify criteria which contribute to the growth and expansion of sciences throughout human communities. Scientometrics is a part of science sociology which is used to make scientific policies and includes quantitative studies in scientific activities and publications in that scientific area (Hood and Concepcins, 2001).

This analysis determined the current state of research and trends in studies about dermatology between 1974 and 2016. In his 1963 book "Little Science, Big Science", which is a fundamental work in scientometrics, Price argues that the number of scientific articles are doubled every fifteen years. Such a growth rate cannot be attributed on a single factor only and it can be concluded that such growth is the essence of science (Price, 1963). Evaluating the results highlights that the scientific productions in dermatologic area have shown a rising trend. The results of this research are in agreement with those yielded by Yao et al., (2014), Ramin et al., (2015), Yi et al., (2016), etc.

According to bibliometric principles, if a paper is cited more times than others, its quality is considered to be higher. In other words, the number of citations is indicative of the power and authority in the field of interest. In our study, there was no significant correlation between the JIFs and the citation frequency of articles. This can result from several factors; for example, journals with advance online publication had higher impact factors than journals without advance online publication. Thus, factors other than the quality of papers may affect the citation frequency of a paper (Ramin et al., 2015).

Based on our structural subject statistic results, the published articles mainly focused on Burn, Epidemiology and Treatment. Also Most of the highly cited papers was in burn study. The statistics indicate that burns in Iran are higher than in many other countries. So that burns in Iran are eight times the global average. Every year, 200 to 210 thousand people die in the country (Abouie et al., 2017). The probably reason for further research on this topic. These results provided a current view on the research focuses of dermatology. More importantly, subject categories can represent a suitable guide for future research directions. Although dermatology diseases affecting the quality of life and emotional status of subjects, had largely neglected this subject. Also, the other diseases that are epidemiology in Iran, such as psoriasis, have been less investigated.

Almost all (99.5 %) of the literature in the field was in English. For better international communication, English is the first language of choice for many authors. Among the top 10 journals, five were from the USA. 8 Journals out of 10 journals were from developed countries. In the field of dermatology developed countries have had a great influence on high-level science and the development of technology. Furthermore, publications from these journals were of high quality. The analysis of journals in which papers about Dermatology were published could help scholars select the appropriate journal for paper submission, thereby increasing the chance of acceptance of these journals had high citation.

According to bibliometric principles, if a paper or author is cited more times than others, its quality is considered to be higher. In other words, the number of citations is indicative of the power and authority in the field of interest. So the authors like,Dowlati Y , Hallaji Z, Balighi K who were not active among the top authors but they published high-quality articles.

Our results highlighted that, among the institutions Tehran Univ Med Sci (TUMS) and the ac tive authors “ Firooz A " , “Dowlati Y ", "Chams-Davatchi C" have the most influence in this field. TUMS and its faculty members have a significant role in publishing scientific papers in the field of reproductive medicine. TUMS is the oldest and most well-known medical center in Iran, nationally as well as internationally that was established as a part of University of Tehran in 1934. TUMS, as one of the country’s top research universities, accepts applications from the most qualified students. It also has the largest schools of medicine, over a hundred specialized research center and 10 teaching hospitals. Productivity of a university are mostly related to the authors who are affiliated with that university (Bazm et al. 2016). In other word, institutional centrality within high productions emerges and develops as authors affiliated with that institutions.

In conclusion, through performing the first scientometric survey on dermatology research, we analyzed the characteristics of papers and the trends in scientific production. Co-word analysis revealed outstanding topics of the field, which is useful for policy makers to learn about the research status and make appropriate decisions for the promotion of scholarly products. This study did not describe the features of journals, institutions or authors and do not compare the situation of Iran with other countries.

Limitation

We must take this limitation into account that studied data are from Web of Science. Searching other databases such as Scopus or PubMed database may lead to different results. However, In addition, performing similar researches using other scientometric techniques such as studying co-authorship and Co-occurrence network for countries, Co-occurrence network for Institutionsand other citation analysis can act as a complementary to this research.

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